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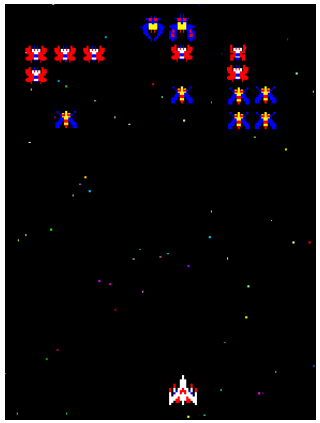
Space Force Duo

Overview

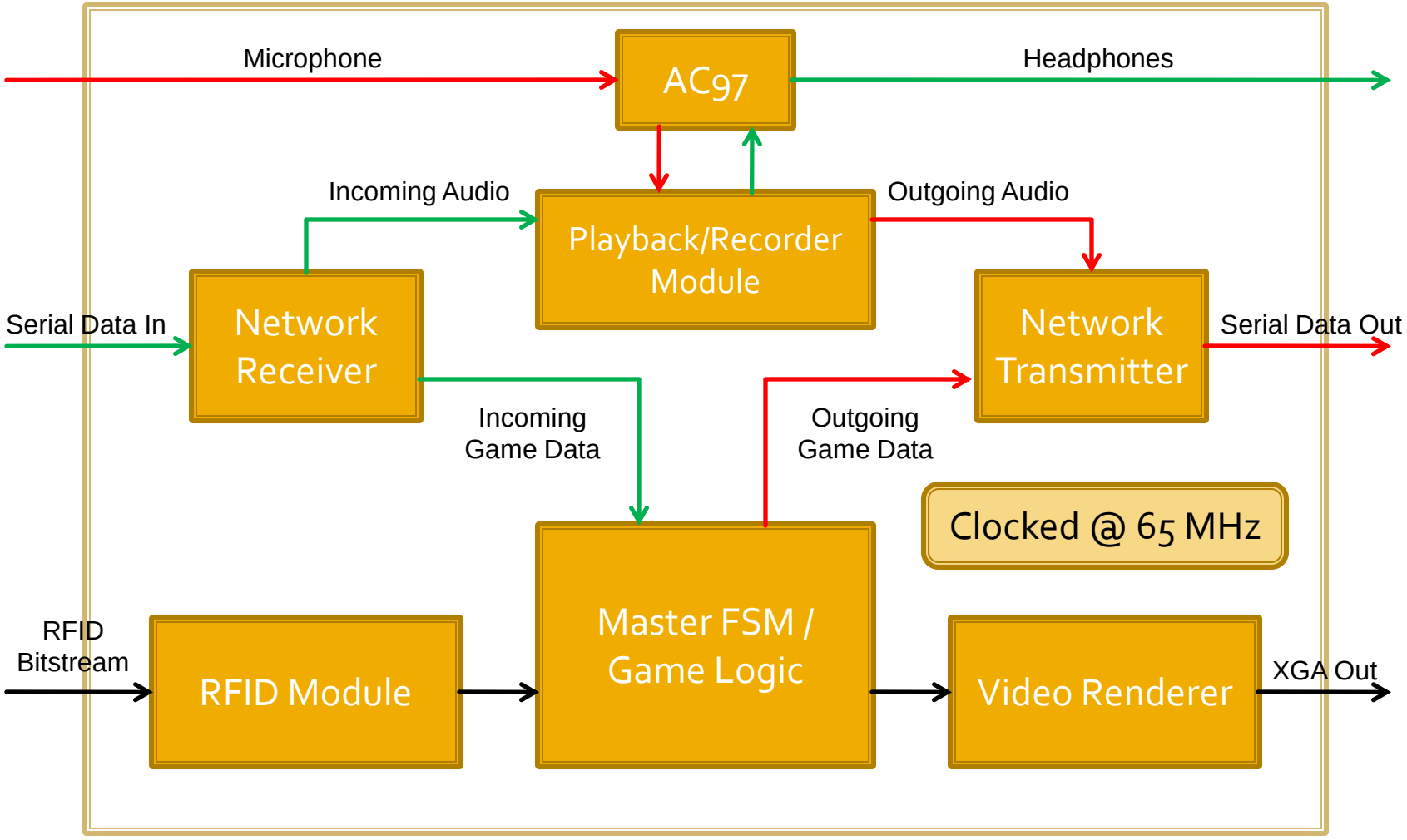
- Two-Player space shooter game
- Two FPGA's connected through Serial port for two-way communication
- Features voice-communication
- Log into the game using RFID tags



http://www.shockinglyfun.com

http://www.harrowaudiohifi.co.uk

Block Diagram



Networking Module

- Packetizes incoming data.
- 2 byte Header + body

Header:

Length	Type	To	From	Number	Total
5 bits	3 bits	2 bits	2 bits	2 bits	2 bits

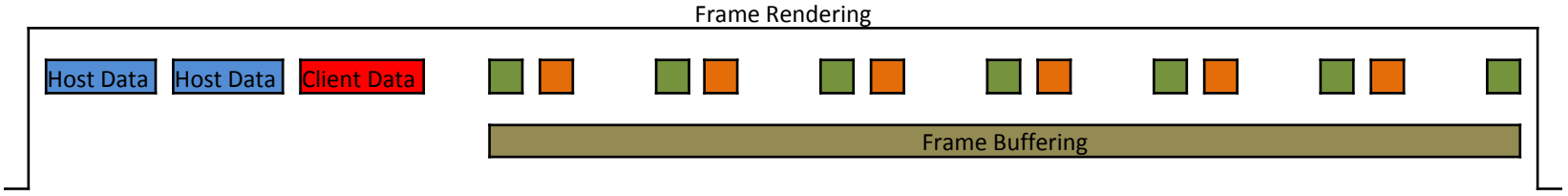
- Some Packet Types:

Game Data:

X1	Y1	X2	Y2	…	X6	Y6	Unused	16 bytes
11 bits	10 bits	11 bits	10 bits	…	11 bits	10 bits	2 bits	128 bits

Audio Samples:

Sample 1	Sample 2	…	Sample 7	Sample 8	8 bytes
1 byte	1 byte	…	1 byte	1 byte	64 bits

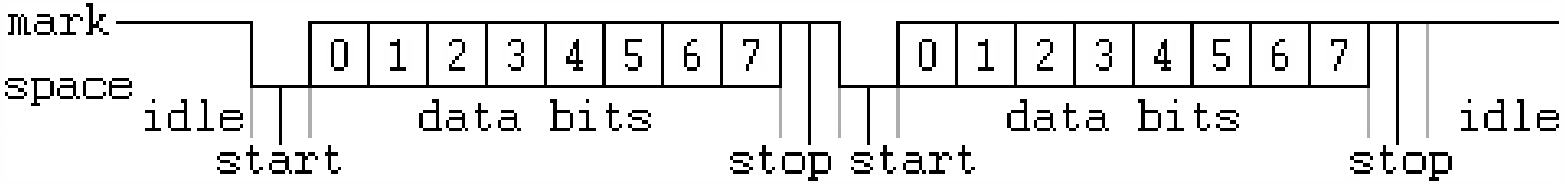


Audio Module

- Microphone samples from AC97 are recorded, downsampled to 6kHz, and passed through 3kHz low-pass filter.
- Samples sent through network.
- Incoming samples are played back.
- Samples are 8-bits wide.

Serializer/Deserializer

- Transmits/Receives data serially using RS-232 scheme
- Data rate of 200 kbps



http://www.wikipedia.org

Master FSM/Game Logic

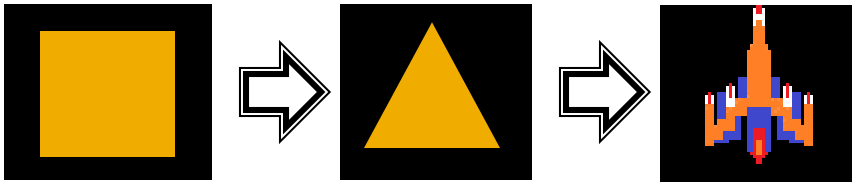
- Determines the Host and the Client
- Control the state of the game
- Determine collisions and coordinates of all sprites

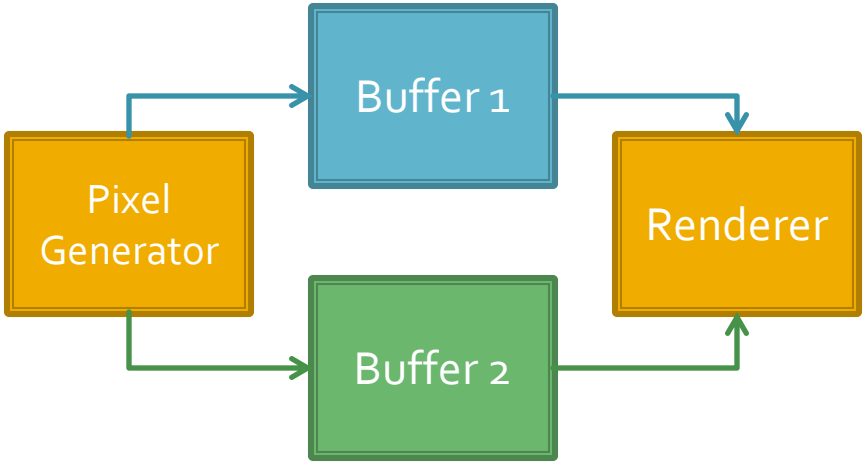
http://media.giantbomb.com

http://www.globalnerdy.com

Video Renderer

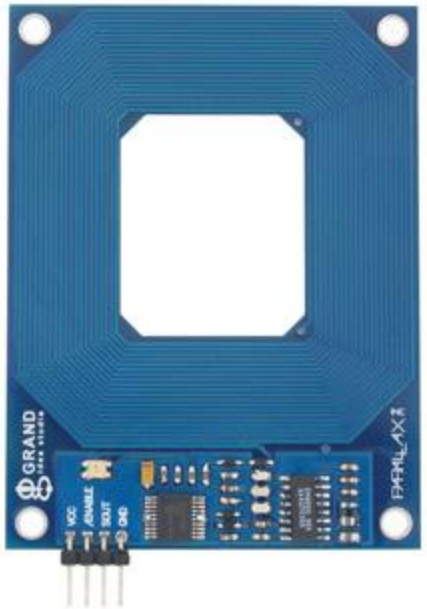
- Game runs at 1024x768 @ 60Hz
- Color information is compressed to 3 bits for RGB.
- Early version will render sprites as mono-colored rectangles.
- If time permits, detailed image sprites will be rendered instead.





RFID Module

- RFID Reader
- Asynchronous receiver (RS-232):
- Database: match 10-byte ID number to a user name



http://www.parallax.com/

Major Challenges

- Information flow control; preventing buffer overflow
- Handling packet corruption
- Bandwidth limitations
- Reading/writing to frame buffer fast enough
- Hiding unused sprites
- Scalability of maximum sprites
- Interfacing with the RFID reader

Time Line

Week	Charlie (Audio/Network)	Javier (Game/RFID)
11/16	Packetization of audio; serial transfer	One-Player game with 5 enemy ships
11/23	Game data packetization; bi-directional serial communication	Two-Player game with 4 enemy ships; frame buffering
11/30	RFID login information packetization, debugging	RFID login using generic transponders, scale number of enemies and bullets, add levels.
12/07	System integration; debugging; polishing	System integration; debugging; polishing